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13. ABSTRACT (Maximum 200 words) Xnetlib is a new tool for software distribution. Whereas its predecessor netlib uses e-mail as the user interface to its large collection of public-domain mathematical software, xnetlib uses an X Window interface and socket-based communication. Xnetlib makes it easy to search through a large distributed collection of software and retrieve requested software in seconds.				
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# Software Distribution Using Xnetlib\*

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August 31, 1995

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## 1 Introduction

The objective of the project was to develop a tool that allowed users to retrieve software and information from distributed repositories. Previously, the best means of retrieving software was through Netlib, a program that distributes small pieces of public-domain mathematical software by e-mail. The Xnetlib project greatly expanded on this capability, allowing users easier and faster access to a much larger body of software and information.

The remaining sections of this report describe the approach and accomplishments of the Xnetlib project. A graphical overview of the project is appended to this report.

## 2 Approach

The major components of this project include developing an X Windows graphical user interface, using socket-based communication, and distributing the retrievable software among multiple sites.

Xnetlib, the X Windows graphical user interface to the Netlib software repository, allows users to retrieve software quickly and easily. Netlib users previously had to type one or more requests and e-mail them to the Netlib

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server. Using the Xnetlib interface, users can now browse through a distributed software collection, select and retrieve software, all with just a few button clicks.

To speed up the processing of software requests and file transfers, Xnetlib uses interprocess communication (IPC) sockets to communicate with the server process running at the Netlib site. In addition, Xnetlib caches frequently requested indexes so that time is not wasted repeatedly retrieving the same information.

Other components of this work include using fuzzy search techniques to improve keyword and other searching, adding the capability of remote execution for certain tasks, expanding the scope of the collection to include electronic journals and multimedia, distributing entire libraries, integrating Xnetlib with other INTERNET information tools, automatic software classification, and automatic translation across classification schemes.

The aim of the Xnetlib project shifted from providing a specialized client and server to integrating Netlib with the World Wide Web and to working with others in the WWW development community to increase the functionality, reliability, efficiency, and quality of the Web.

## **3 Accomplishments**

### **3.1 WWW access**

HTTP access to Netlib files now accounts for over half the total number of requests. The total number of requests for Netlib files at the Tennessee site during 1994 was 2,010,287. Based on the rate of requests during the first seven months of this year, the 1995 total will exceed 4,000,000. The popularity and widespread use of Web clients such as Mosaic and Netscape has undoubtedly contributed to more users being aware of the existence of Netlib and consequently to the growth in Netlib requests. As part of its Web interface, the Netlib repository provides access to its Conferences Database, Performance Database, and Na-Net electronic community. In addition, a forms-based interface that permits interactive field-specific searching of the Netlib index files has been provided. The URL for Web access to Netlib is <http://www.netlib.org/>.

## 3.2 Expanded scope

The scope of Netlib, which was originally a collection of mathematical software, was expanded to encompass more parallel processing tools and applications software relevant to high performance computing. Some of the additional software has been included within Netlib itself, but some is instead being incorporated into the National HPCC Software Exchange (NHSE), which includes Netlib. The URL for the NHSE is <http://www.netlib.org/nse/>.

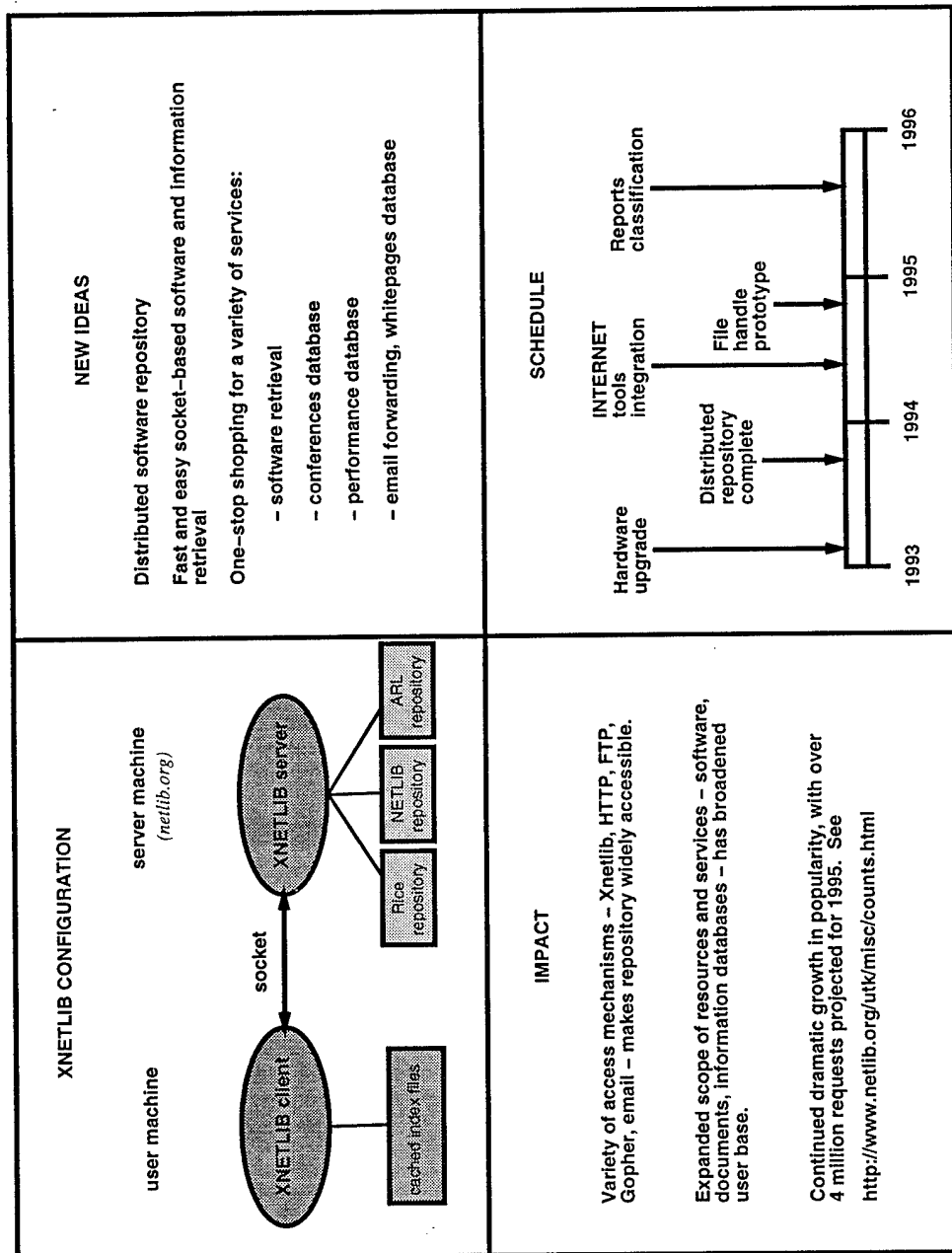
## 3.3 Resource authentication and integrity

The architecture of Netlib is a collection of mirror sites that fully replicate each other's collections. A certain site is the master for any particular Netlib directory, and the other sites update their copies by running a nightly mirroring protocol. Both Netlib and the NHSE are being faced with the situation, however, where a software contributor wishes to maintain the master copy of his software and its associated indexing information on his own local file server. Another problem is that current Netlib mirroring is not transparent – i.e., the user must know the locations of the different mirror sites in order to access them. Furthermore, if change to the master copy of a Netlib file has occurred since the last nightly update, the user must know which site is master if he wishes to obtain the up-to-date copy. Thus the need has arisen for a publishing and file access system that permits location-independent naming of files, automatic name-to-location resolution, transparent file mirroring, and authentication and integrity checking. The Xnetlib Team has developed a prototype of such a system that includes distributed name and location services, as well as a client library that supports name-to-location resolution. The name service returns meta-information for a given name. This meta-information includes a location-independent file handle that is immutably associated with a specific sequence of bytes. The file handle may be sent in a request to the location service to obtain a list of locations from which the file may be retrieved. The publishing and file access system will not include a search interface itself, but will provide for export of relevant meta-information to an external search service such as Harvest. The Xnetlib Team participated in the beta test of Harvest during fall of 1994 and is currently using Harvest to provide a search interface to the NHSE collection.

### **3.4 Reports**

We are now responsible for providing an online reports information service for reports lists submitted to ACM's SIGNUM (Special Interest Group on Numerical Mathematics) Newsletter. SIGNUM currently provides only a hardcopy listing for its readers. The online service will enable faster dissemination of information and improved searching and classification by allowing submitters to provide keyword and abstracting information.

# SOFTWARE DISTRIBUTION USING XNETLIB



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Figure 1: Graphical overview of Xnetlib project